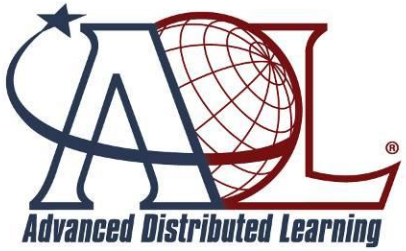


The Power of Global Collaboration

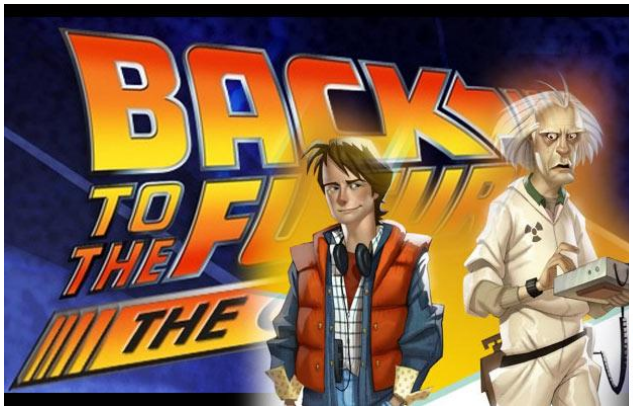
Defense | Government | Industry | Academia

Games

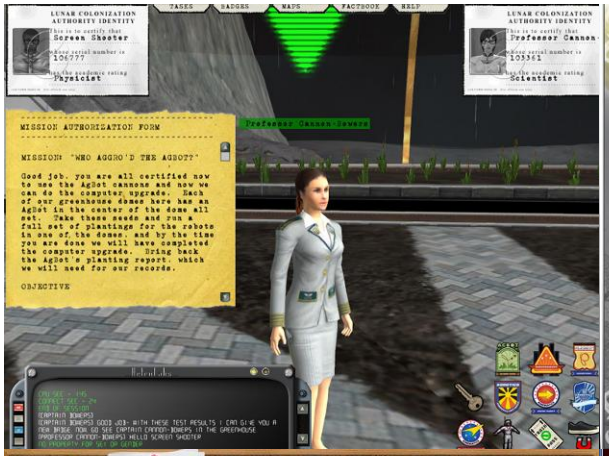
iFest 2011 – 2, 4 August 2011

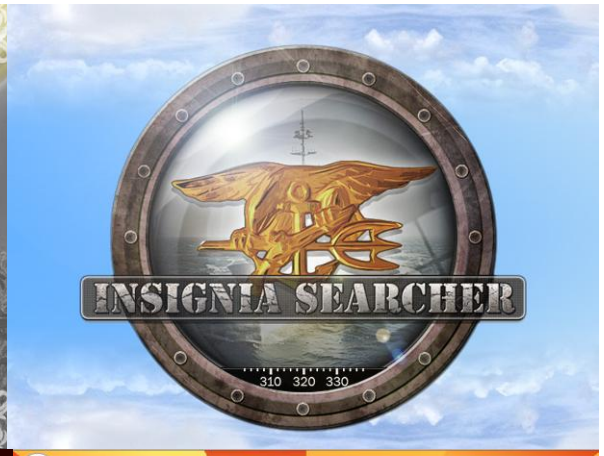
Peter Smith, Emerging Technologies Team Lead,
Contractor with Katmai Support Services

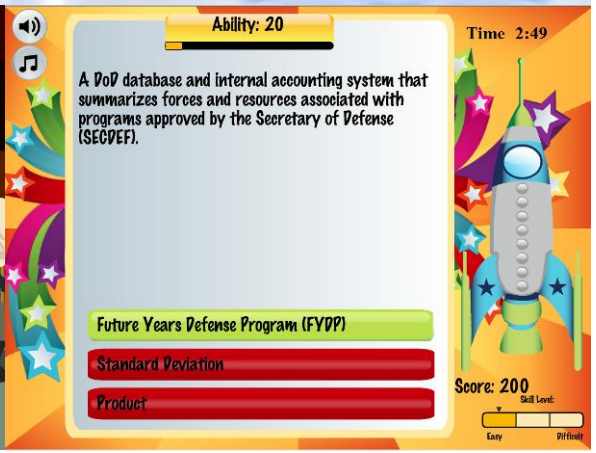
What I'm Playing



Games We've Made







History of Serious Games

- Ancient Games
- Board Games
- Early Electronic Games
- Modern Serious Games

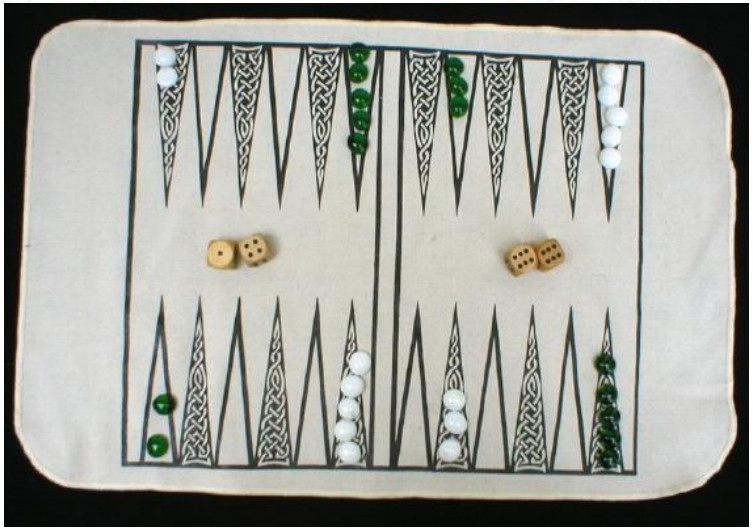
Senet 5000BC

- Found in tombs
- Egyptian ancestor to checkers
- Religious mysticism. The space you end at forecast good or bad fortune
- Entertainment and a mystical window

Ur 2500BC

- Royal Game of Ur
  - Race To the Finish

- Backgammon
  - Random Element
  - Chance Plays a Role



Mancala, 1400BC

- Began as an accounting tool for trading goods
- Evolved into a form of entertainment
  - A means of gambling on cattle, sheep, and goods
- Does being good at Mancala make you better at trading animals and food?

Chess/Go/Etc

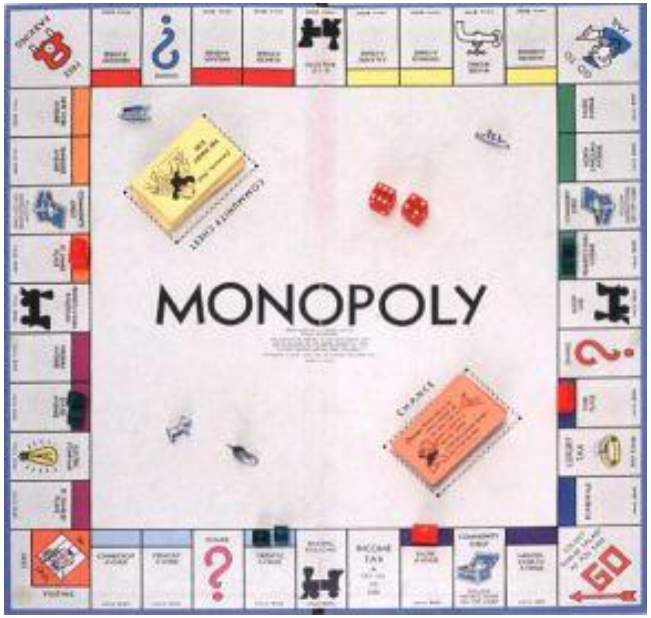
- Western Chess emerged around 500AD
- One of the most widely played games of strategy in the Western world.
- The game has always symbolized strategic and tactical thinking.
- Mastery of the game has always implied some degree of skill in commanding military forces.

Family Board Games

- Stratego, Diplomacy, Risk, etc.
  - Strategy Focused
- Scrabble
  - Spelling
- Monopoly
  - Investment Strategy
- Connect 4
  - Lateral Thinking

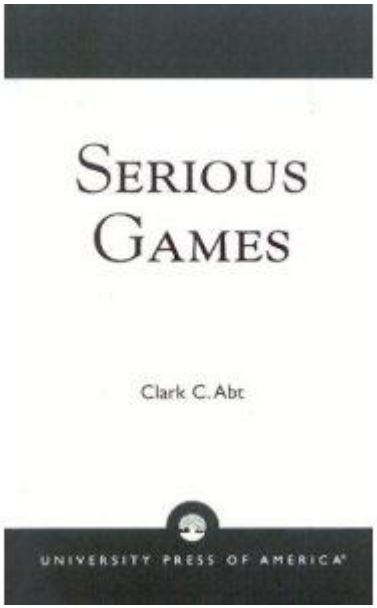
Monopoly, 1936

- George Parker founded Parker Brothers in 1883
  - Invented *Banking* in 1887
  - Bought Monopoly rights from Charles Darrow in 1936
- Monopoly games distributed by the Red Cross to POWs in WWII
  - Board contained 2 files and a compass
  - Hollow piece contained a map of the area printed on silk
  - Real German, Italian, and Austrian money was mixed with the play money



Serious Games (The Book)

- Published in 1970
- Written by Clark C. Abt



Definitions

- "*Reduced to its formal essence, a game is an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context. A more conventional definition would say that a game is a context with rules among adversaries trying to win objectives.*
- "*We are concerned with serious games in the sense that these games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement*."

  – Abt, C. (1970). *Serious Games*. New York: The Viking Press.

Home Game Consoles, 1972

Magnavox Odyssey, 1972

Atari 2600, 1983

Nintendo Entertainment System, 1984

Sega Genesis, 1989

Super NES, 1991

Sega Saturn, 1994

Sony Playstation, 1995

Nintendo 64, 1996

Sega Dreamcast, 1998

Playstation 2, 2000

Game Cube, 2001

Microsoft X-Box, 2001

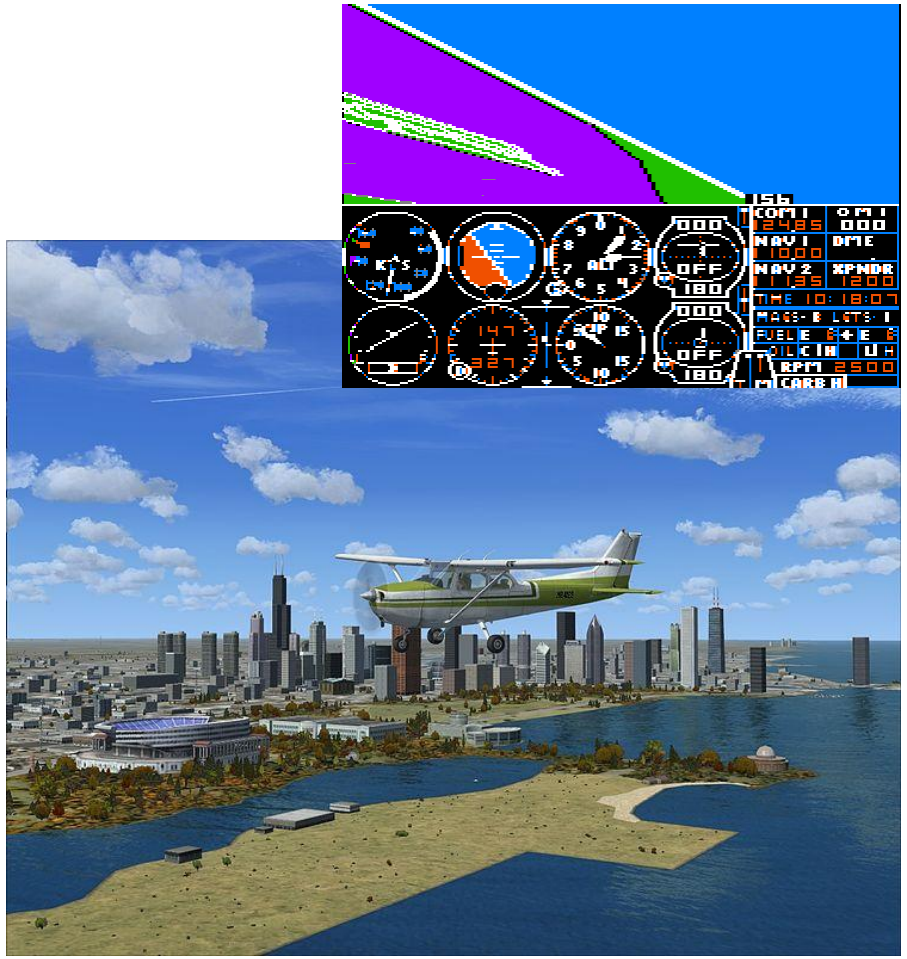
X-Box 360, 2005

Nintendo Wii, 2006

Playstation 3, 2006

Flight Simulator

- First Developed for Apple II and TRS-80 in 1980
- Became Microsoft Flight Simulator

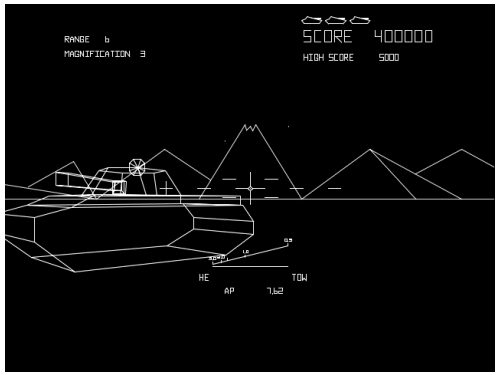


Battlezone

- First 3D vector graphics
- Red / Green actually done with overlays
- Published 1980

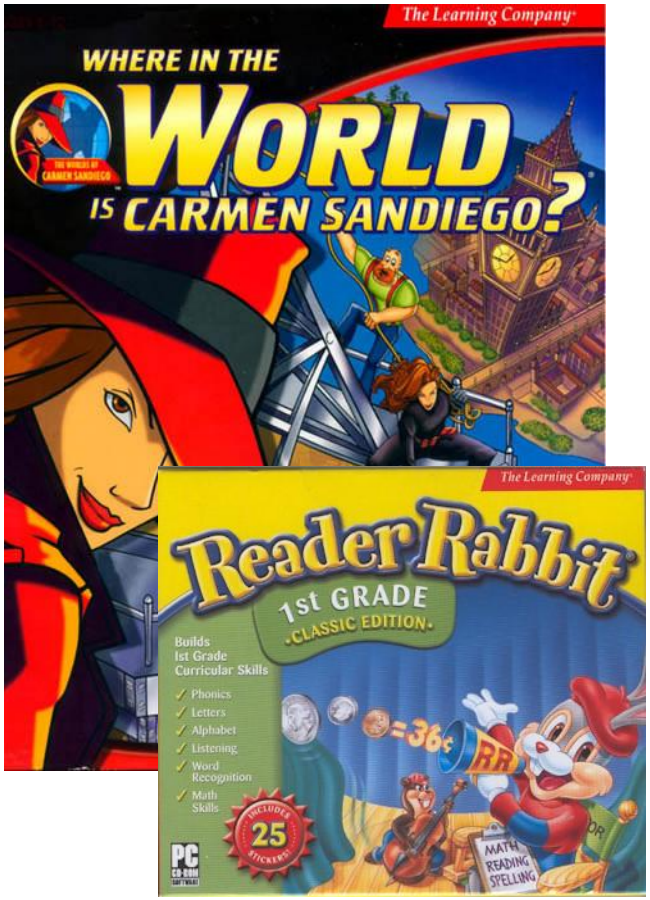
Atari Bradley Trainer

- First Military Serious Game
- Custom Controls
- Acted as Gunner
- Built in 1981 (Never Released)



Edutainment

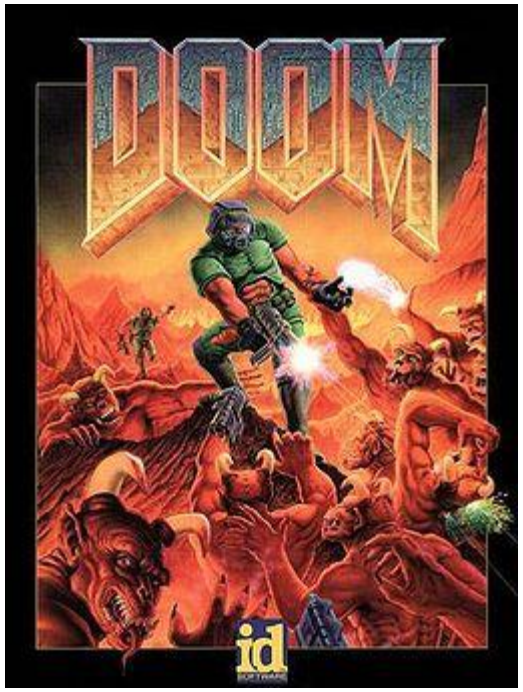
- The Learning Company
- Broderbund
- Reader Rabbit
- Math Blaster



SimCity 1989

Doom

- Follow up to Wolfenstien 3D, the first FPS
- First Modifiable Game
- Published in 1993 as Shareware

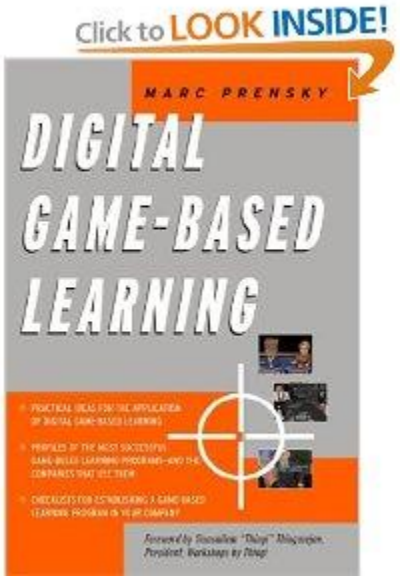


Marine Doom

- First Mod
- Created in 1996
- Lowered life to reasonable level and emphasized team tactics

Digital Game Based Learning

- Marc Prinsky
- Coined Digital Native
- Published in 2001



Serious Games Initiative

Serious Games initiative

- Established in 2002
- Woodrow Wilson Center for International Scholars
- Helped Launch the Serious Games Summit at GDC in 2003
- Launched the Games for Health Project with the Robert Wood Johnson Foundation

America's Army

- First Released in 2002
- Available Free Online
- Army recruiting tool created through partnership between:
  - Army Accessions Command
  - West Point
  - Naval Postgraduate School

DARWARS AMBUSH, 2003

- DARWARS was a DARPA sponsored project (with JFCOM and USMC PM TRASYS) to create training systems that incorporate games and related learning technologies
- AMBUSH! was the game component built on the Operation Flashpoint game
- Transferred to PEO-STRI in 2006 for deployment to Army Units
- Now deployed to 400 sites

DARWARS

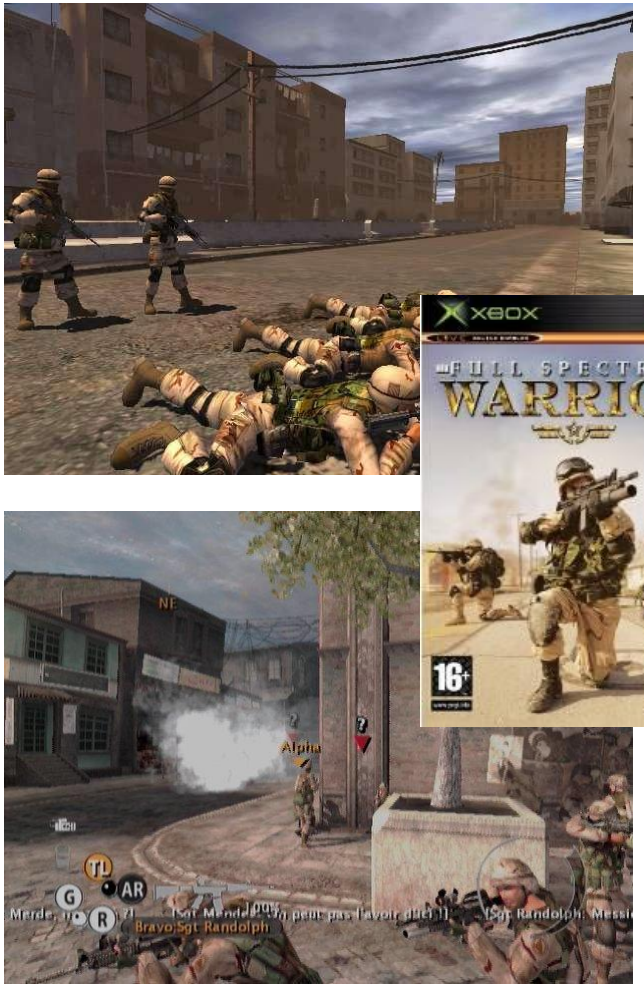
DARWARS Tactical Iraqi, 2003

- Language training game developed within the DARWARS program
- Conceived and created at USC ICT
- Spun-off as a commercial company and product

Tactical LANGUAGE & CULTURE Training System by alelo INC.

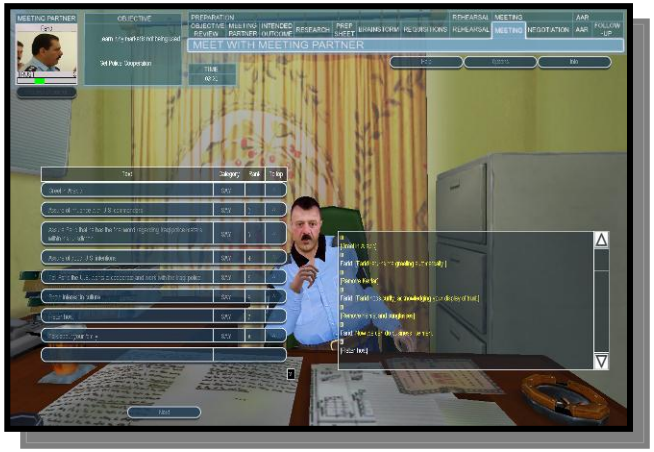
Full Spectrum Warrior, 2004

- Joint Army/Entertainment title for the Xbox
- Create a game with entertainment-level quality, but with an embedded Army mission
- Dual-use Applications
- Microsoft agreed to support the title if it could be sold commercially as well
- USC ICT and Pandemic Studios
- Famous for having an Army-mode secret key which was immediately released on the Internet



BiLAT, 2006

- PC, game-based, cognitive training tool used for developing skills in how to plan for and conduct successful bi-lateral meetings and/or negotiations in different cultural settings
- Key Learning Objectives – to develop skills in:
  - Negotiation Strategy
  - Cultural Awareness
  - Trust-Building Strategy
- Developed jointly by USC ICT, RDECOM STTC, ARL, and ARI



VBS2, 2009

- VBS2 from Bohemia Interactive via LaserShot
- Contract to replace AMBUSH
- Acquired with out-of-the-box capabilities, no new development to meet requirements
- Licensed for use by anyone in the US Army or any Army project

A Journey...

Serious Games =

- Game-based simulation
- Games for government foresight & public policy
- Broader idea of what games can be
- A description for a broader reapplication of videogame resources
- An application of videogames

Market Segments

Enterprise	Non-Entertainment Users			Retail
Instructors & Users	E-Learning	Modeling & Simulation	Commercial Serious	Game Developers
	Education Software	Serious Games	Serious COTS	
	Game Marketing & Cultural Cues	Serious Stuff Gamers Do	Commercial Gaming	
Game Influenced	Entertainment & Gamers			Actual Game

Names Used for Serious Games

- Educational Games
- Simulation
- Virtual Reality
- Alternative Purpose Games
- Edutainment
- Digital Game-Based Learning
- Tactical Decision Maker
- Immersive Learning Simulations
- Social Impact Games
- Persuasive Games
- Games for Change
- Games for Good
- Synthetic Learning Environments
- Game-Based “X”

Games: 30+ Years of Evolutionary Design

Tens of Millions of Customers

Tens of Millions of GPUs

30+ Billion Revenues

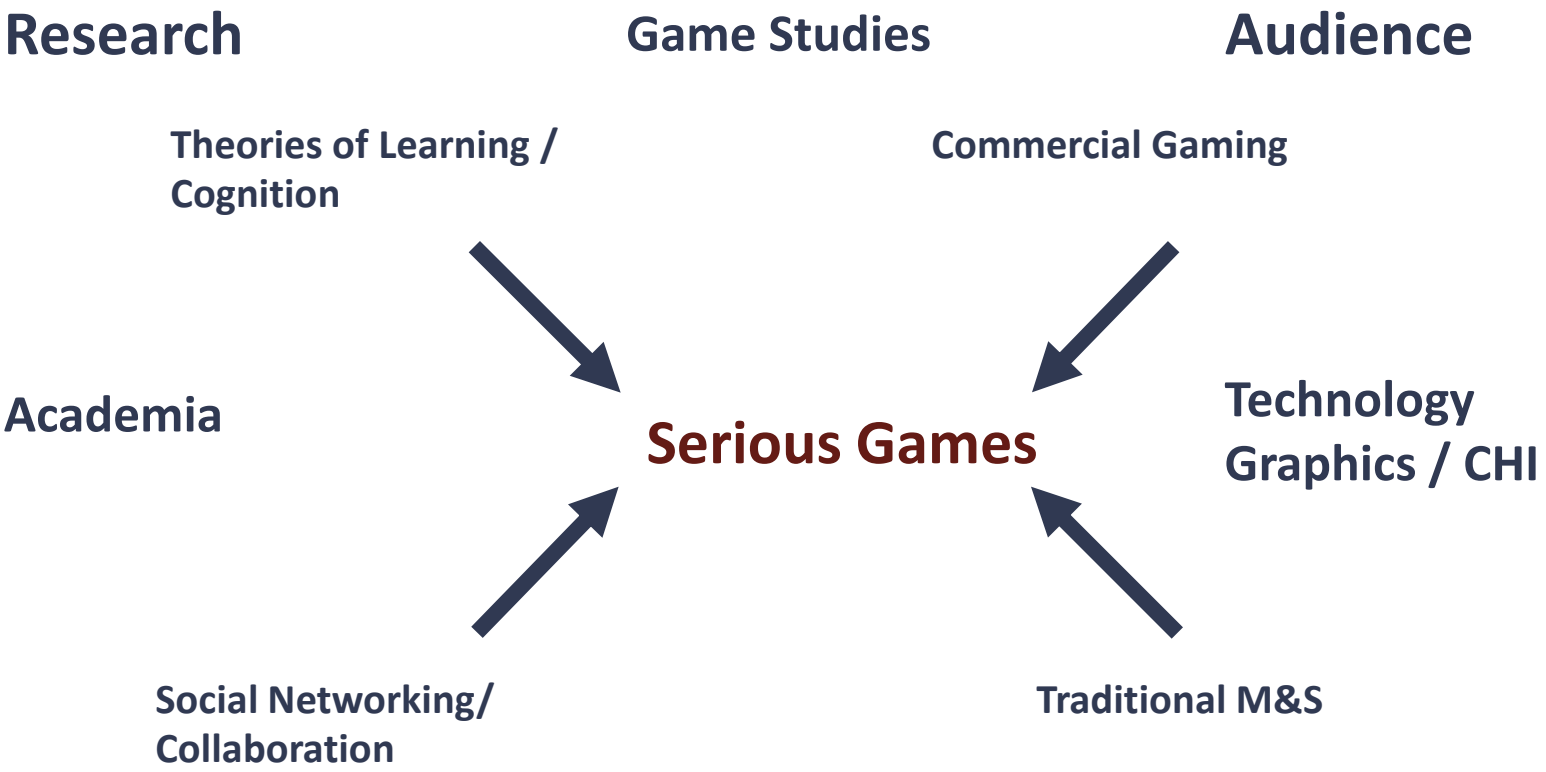
Alternative Inputs

Global Culture

Major Multicore Platforms

Darwinian Business Environment

Serious Game Drivers



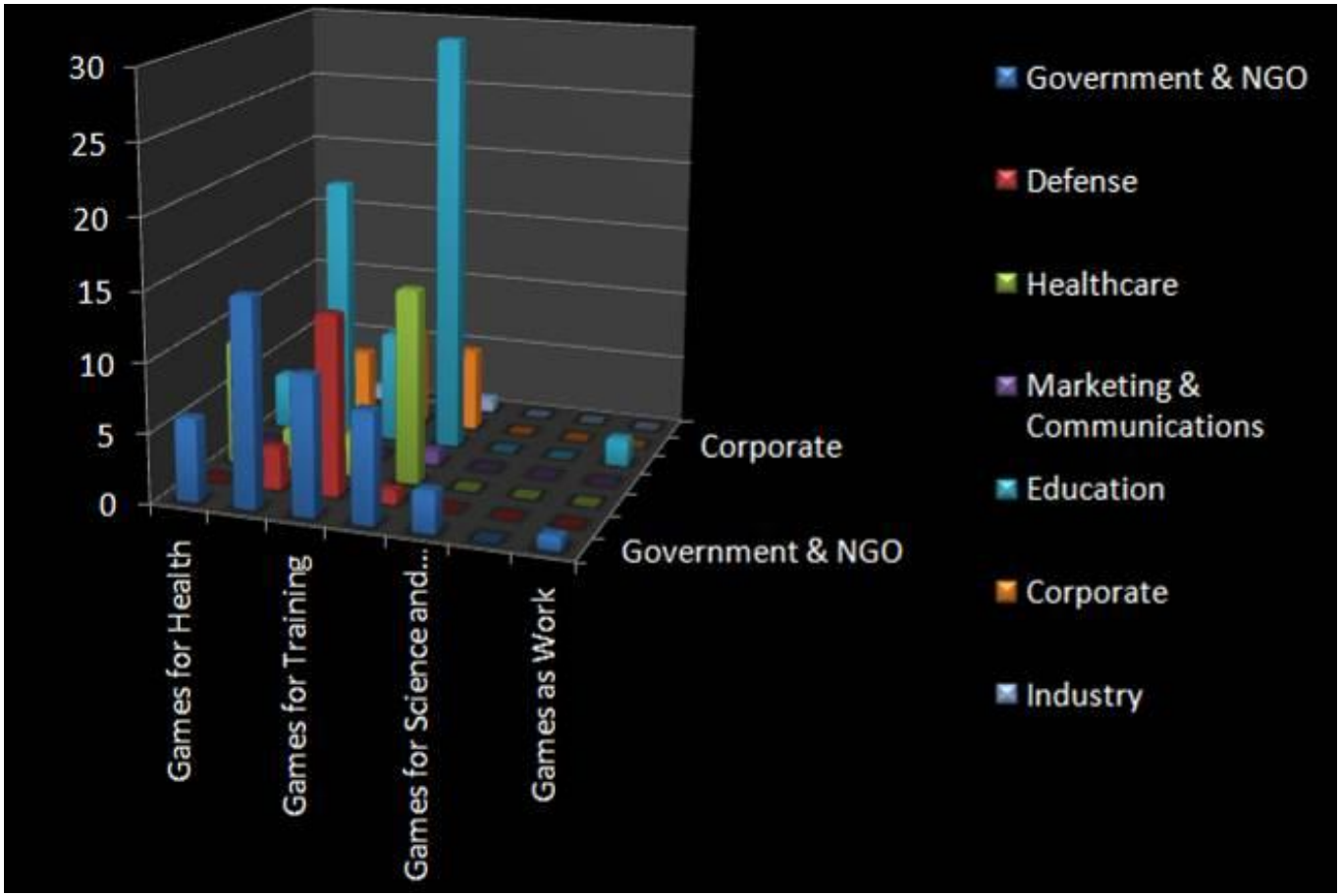
Why A Taxonomy?

- Get all serious games parties on same page
- Erase various myths about serious games
- Provide snapshot for current state of Serious Games industry
- Find where R & D is lacking
- Create foundation for future efforts & organizing

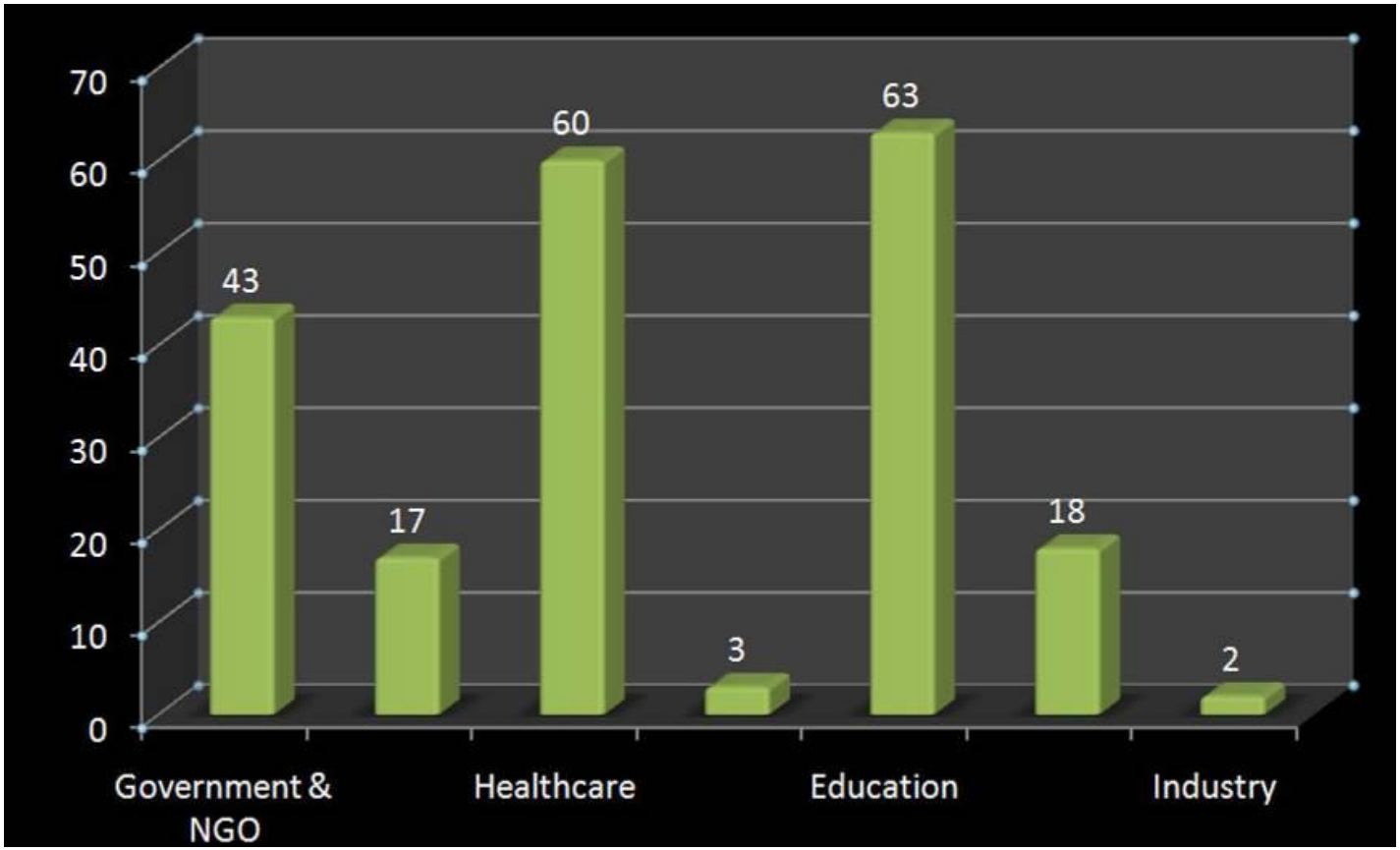
Taxonomy of Serious Games

	Games for Health	Advergames	Games for Training	Games for Education	Games for Science and Research	Production	Games as Work
Government & NGO	Public Health Education & Mass Casualty Response	Political Games	Employee Training	Inform Public	Data Collection / Planning	Strategic & Policy Planning	Public Diplomacy, Opinion Research
Defense	Rehabilitation & Wellness	Recruitment & Propaganda	Soldier/Support Training	School House Education	Wargames / planning	War planning & weapons research	Command & Control
Healthcare	Cybertherapy / Exergaming	Public Health Policy & Social Awareness Campaigns	Training Games for Health Professionals	Games for Patient Education and Disease Mgmt.	Visualization & Epidemiology	Biotech manufacturing & design	Public Health Response Planning & Logistics
Marketing & Communications	Advertising Treatment	Advertising, marketing with games, product placement	Product Use	Product Information	Opinion Research	Machinima	Opinion Research
Education	Inform about diseases/risks	Social Issue Games	Train teachers / Train workforce skills	Learning	Computer Science & Recruitment	P2P Learning Constructivism Documentary?	Teaching Distance Learning
Corporate	Employee Health Information & Wellness	Customer Education & Awareness	Employee Training	Continuing Education & Certification	Advertising / visualization	Strategic Planning	Command & Control
Industry	Occupational Safety	Sales & Recruitment	Employee Training	Workforce Education	Process Optimization Simulation	Nano/Bio-tech Design	Command & Control

Projected Taxonomy



Games by Industry



Repurposing Games as Tools

Anti-Sniper Bot RedOwl

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Serious Games

Last Year at GameTech Ben Sawyer defined a Serious Game As:

> "*Resources from the field of videogames reapplied for purposes beyond entertainment including education, healthcare, productivity, defense, workforce development, & more.*"

Learning Games

- If Serious Games are not just learning games, what are learning games?
- For that matter what is a game?

Games

How does the Games Industry define Games?

Sid Meier

"*A game is a series of interesting decisions.*" – Sid Meier

Everyone repeats this, not sure anyone knows the source

Retort

"A good strategy game may well be a series of interesting decisions – but a good game is something that meets the play needs of its audience. If you want to make games for the new videogames market, you'd better start striving to understand just what those diverse play needs might involve."

– Chris Bateman, Managing Director iHobo

From, "A Game Isn't a Series of Interesting Decisions" on onlyagame.typepad.com

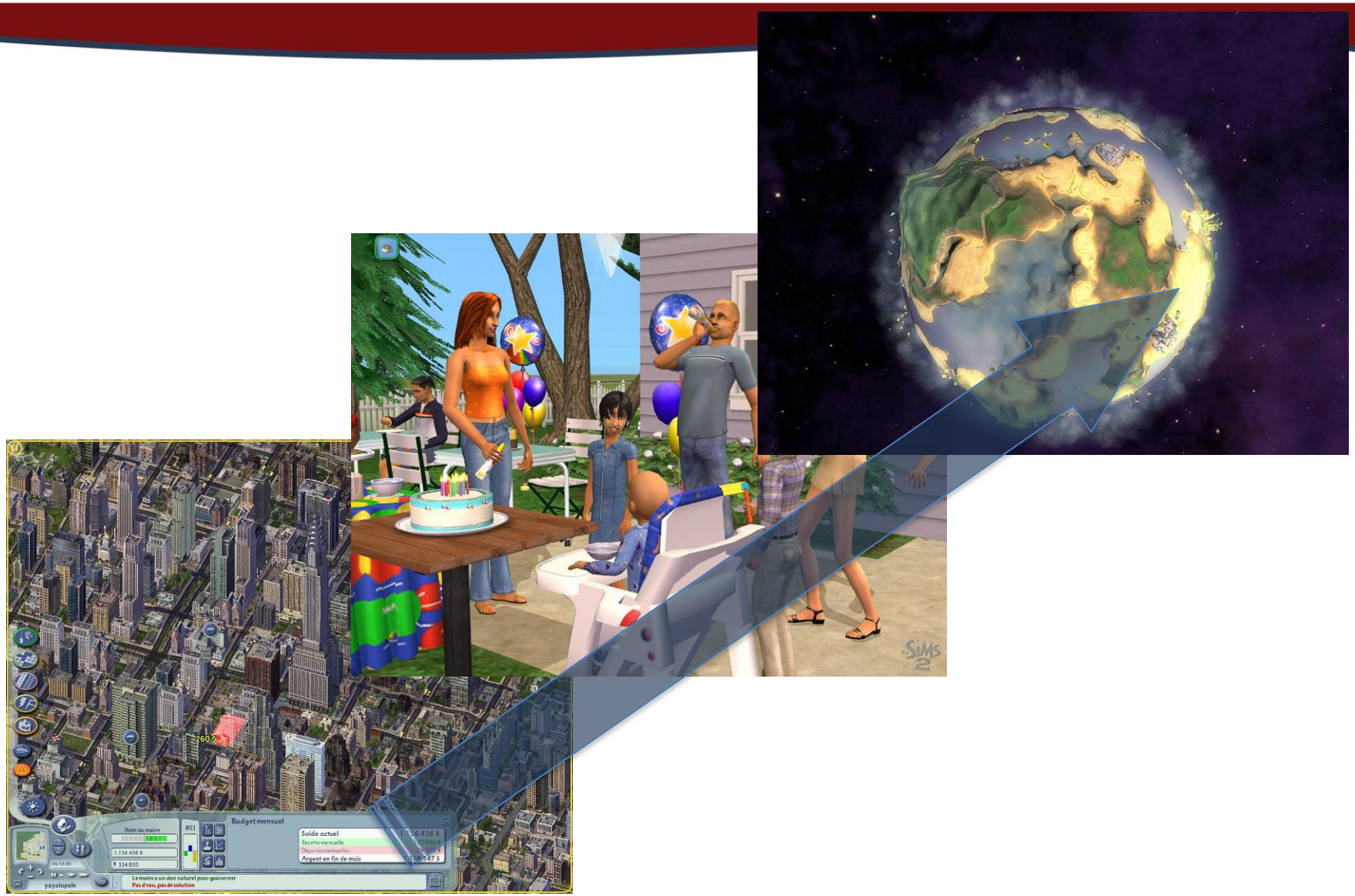
Will Wright

"People call me a game designer but I really like to think of these things more as toys."

– Will Wright

Will Wright: Toys that Make Worlds, TED Talk at www.ted.com

Evolution of Software Toys



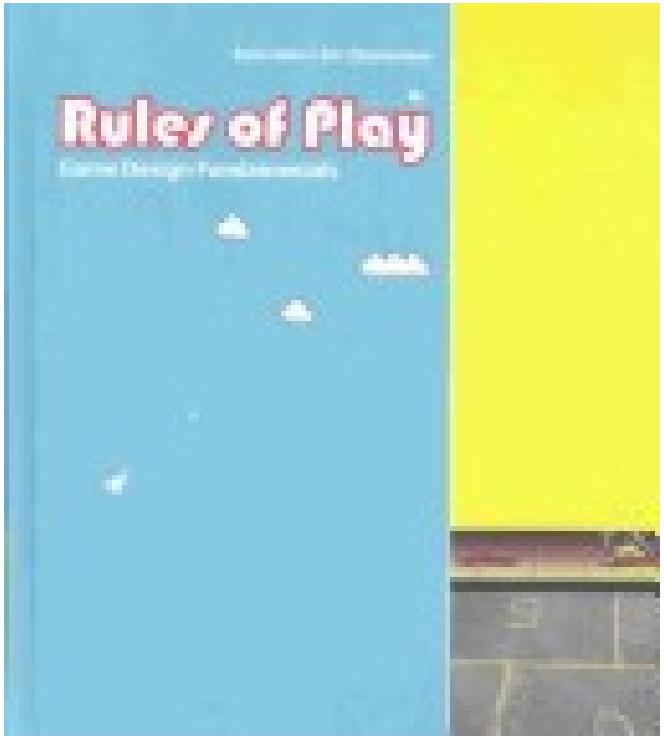
Will Wright's Favorite Games

- Civilization series
- Grand Theft Auto series
- Battlefield series
- Advance Wars on the DS
- Flight Simulator series

"Even though this isn't a game, one of my very first introductions to computer games was the original 'Flight Simulator.' The original one was black-and-white, with wireframe graphics and before Microsoft bought it, Bruce Artwick designed it. It was this little micro world inside the computer that always fascinated me."

Enter “Rules of Play”

- Book by Katie Salen and Eric Zimmerman
- Collected leading experts definitions
- Compiled and crosschecked to build definitive definition
- Most used definition by Game Industry experts



A Comparison

Elements of game definition	Parlett	Abt	Huizinga	Cailois	Suits	Crawford	Costikyan	Avedon
Proceeds according to rules that limit players	X	X	X	X	X	X		X
Conflict or Contest	X					X		X
Goal-oriented/outcome-oriented	X	X			X		X	X
Activity, process, or event		X			X			X
Involves decision-making		X				X	X	
Not Serious and absorbing			X					
Never associated with material gain			X	X				
Artificial/Safe/Outside ordinary life			X	X		X		
Creates special social groups			X					
Voluntary				X	X			X
Uncertain				X				
Make-believe/Representational				X		X		
Inefficient					X			
System of parts/Resources and tokens						X	X	
A form of Art							X	

Game Industry's Definition

"A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome."

– Katie Salen & Eric Zimmerman, Rules of Play

Counterpoint

- Jesper Juul
- Looked at games as
  - Formal System
    - Most like Salen & Zimmerman
  - The Player
  - The World

	The game as formal system	The player and the game	The game and the rest of the world
1. Rules			
2. Variable and quantifiable outcome			
3. Valorization of outcomes			
4. Player effort			
5. Player attached to outcome			
6. Negotiable consequences			

Features of Games (S&Z)

Feature	Description
System	The underlying model that makes the game work
Players	Interact with and control a game
Artificial	A game has a boundary from the “real world”
Conflict	Games present a contest between the players and either the system or others
Rules	Delimit what the player can do
Quantifiable Outcome	Games have quantifiable goals and outcomes

Serious Games

Features of Games for Learning	Ricci, Salas, & Cannon-Bowers	Garris, Ahlers, & Driskell	Cruickshank & Telfer	Abt	Gredler	Zyda	Lieberman	Ritterfeld
Interaction (Interaction/Control/Played/Decision Making)	X	X	X	X		X		X
Feedback (Feedback/Sensory Stimuli)	X	X					X	X
Rules (Rules/Simulation)		X	X	X	X	X	X	
Challenge (Challenges/Competition/Contest/Activity)	X	X	X	X		X	X	X
Narrative (Novelty/Imaginary Setting/Fantasy/Aesthetics)	X	X	X		X			X
Goals (Goal Direction/Goal Setting/Goals)	X	X	X	X	X	X		
Relevance (Personal Relevance/Participation/Role Model)	X						X	X
Motivation							X	
Repetition							X	
Presence								X
Mystery		X						

Feature Comparison

Conventional Games		Serious Games
System		
Players	⟷	Interaction
Conflict	⟷	Challenge
Rules	⟷	Rules
Goals	⟷	Goals
Outcomes	⟷	Feedback
Artificial	⟷	Narrative

Systems

Feature	Description
Objects	Parts and elements of system
Attributes	Properties of system and its objects
Internal Relationships	How objects interact
Environment	External forces acting upon system

Systems = Simulations

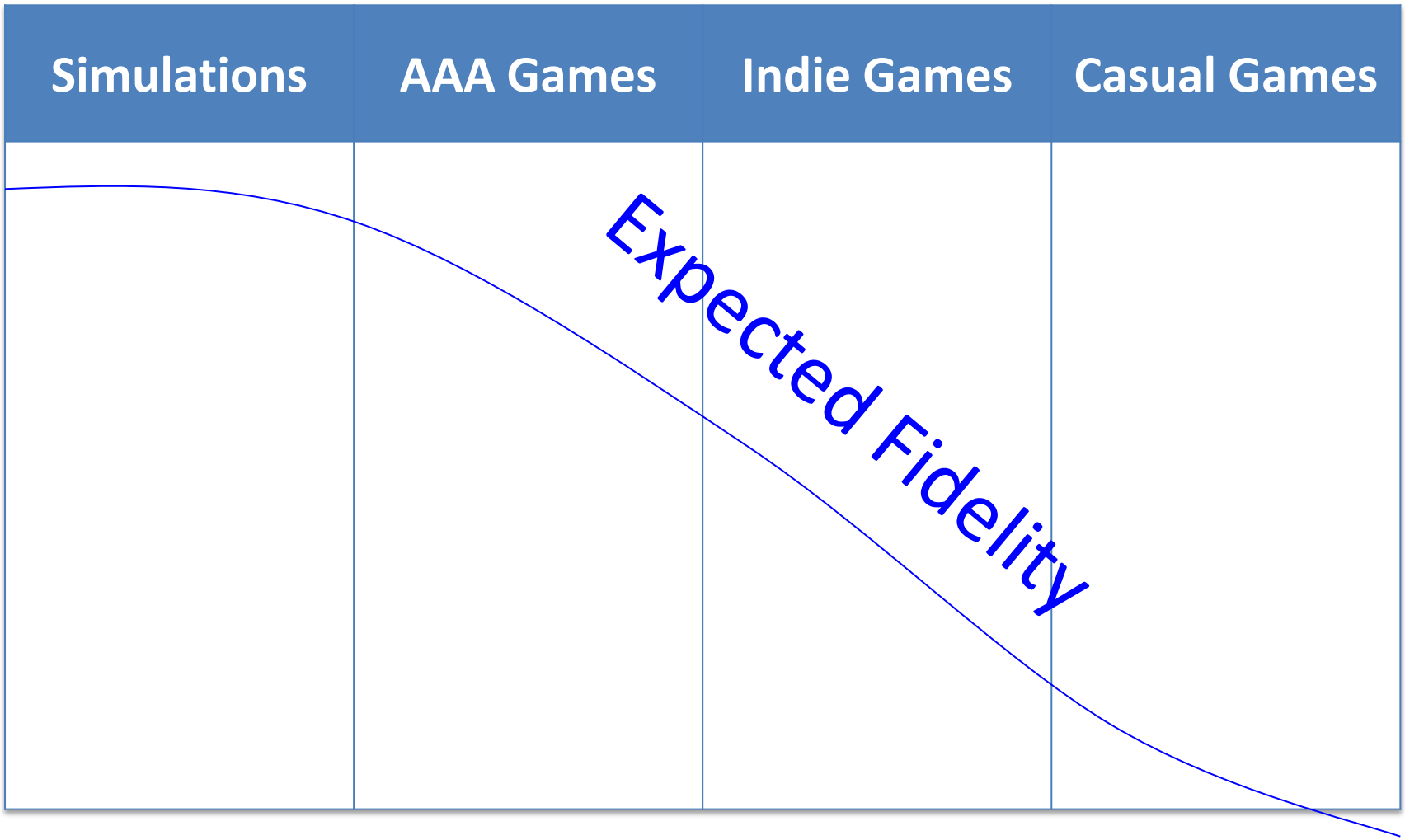
Cruickshank & Telfer

Non-Academic Games (Primarily for fun)	Academic Games (Primarily for or based on learning)	
Conventional Games made for entertainment	**Non Simulation**	**Simulation**
	Games in which the players use principles of a subject or discipline and solve related problems	Games in which players are given a simulated environment in which to play, giving them an insight into the object system or process simulated

Gaming Features

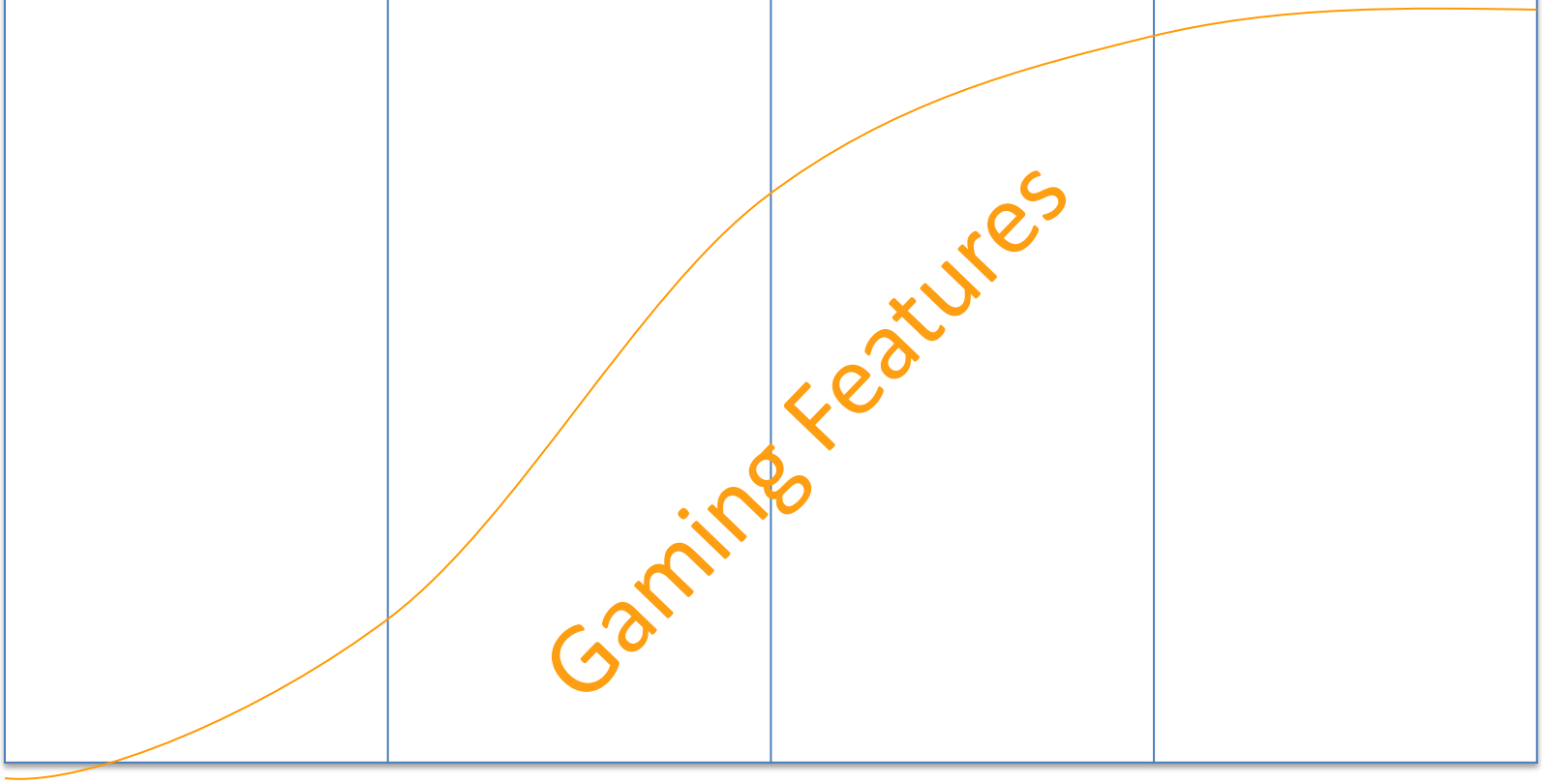
Non-Academic Games (Primarily for fun)	Academic Games (Primarily for or based on learning)		Simulation
	Non Simulation Games	Simulation Games	
1. System	1. System	1. System	1. System
2. Players	2. Interaction	2. Interaction	
3. Conflict	3. Challenge	3. …..	
4. Rules	4. Rules	4. ……	
5. Goals	5. Goals	5.	
6. Artificial	6. Narrative	6.	
7. Outcomes	7. Feedback	7.	

Fidelity and Games for Learning

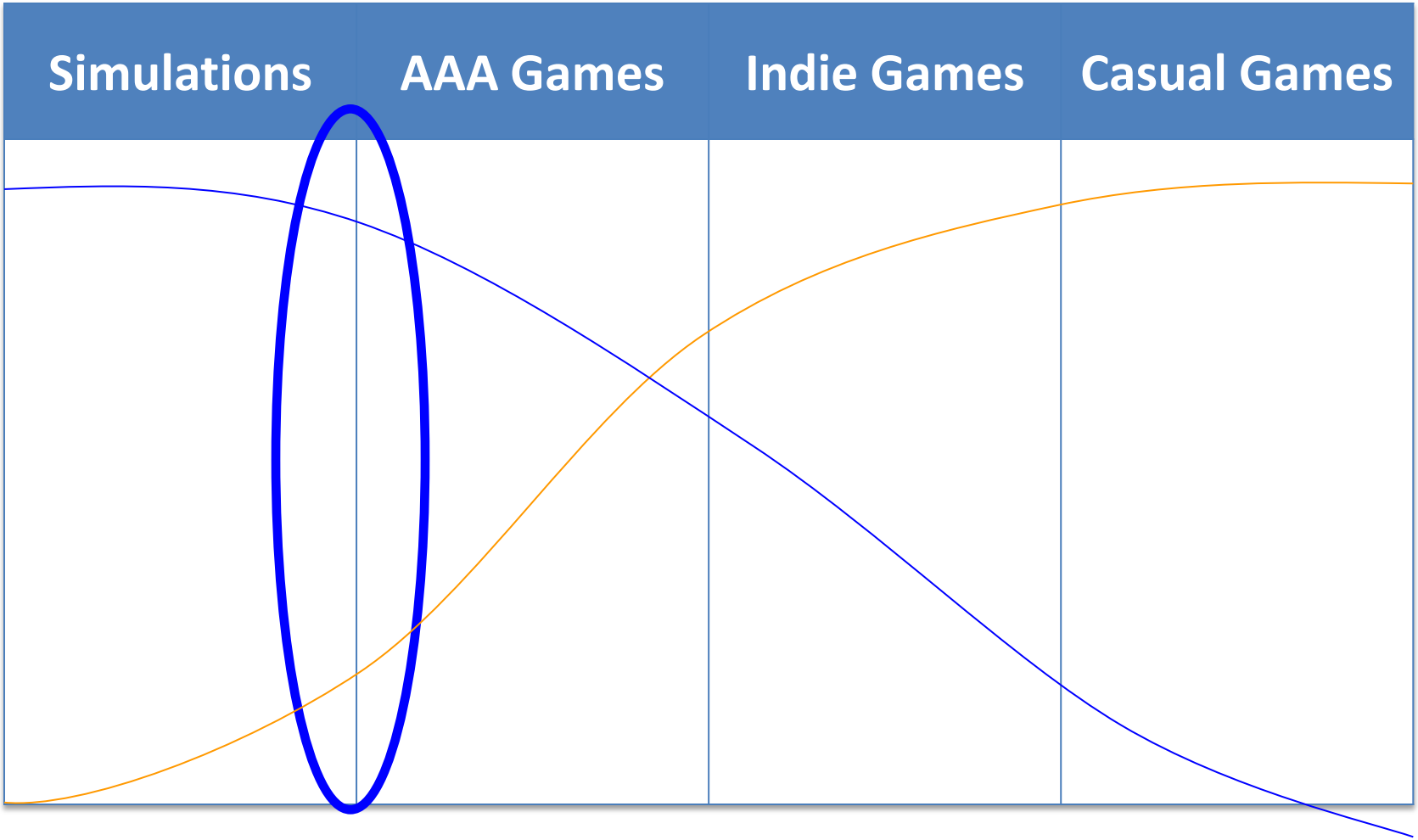


Gaming Features

Simulations	AAA Games	Indie Games	Casual Games

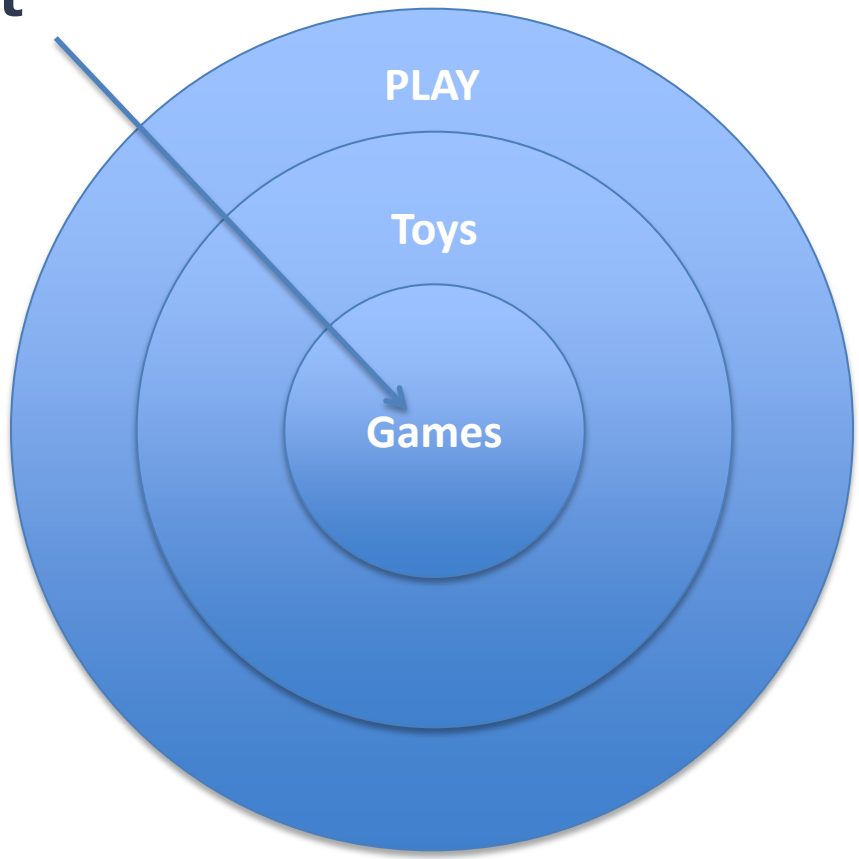


Military Games



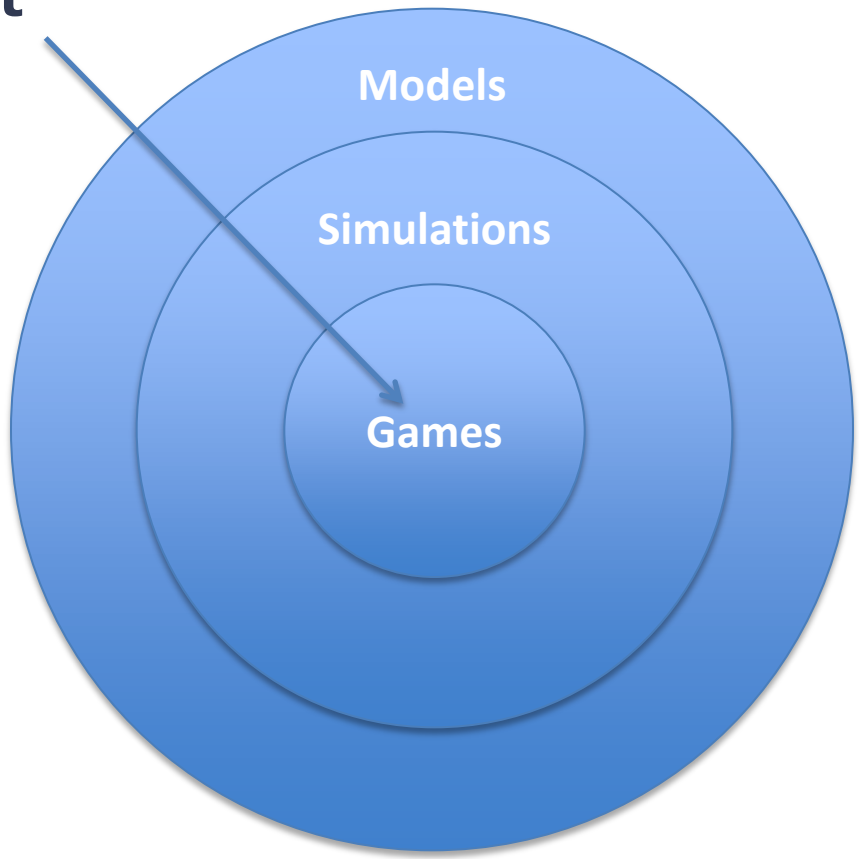
Will Wright's Presentation at GameTech 2010

Levels of Constraint



Learning Games

Levels of Constraint



Learning Games

Games at the intersection of Play, Simulation, and Pedagogy.

Instructional Effectiveness

- Learning content's alignment with learning objectives
- Embodied in mechanics
- Defined by features

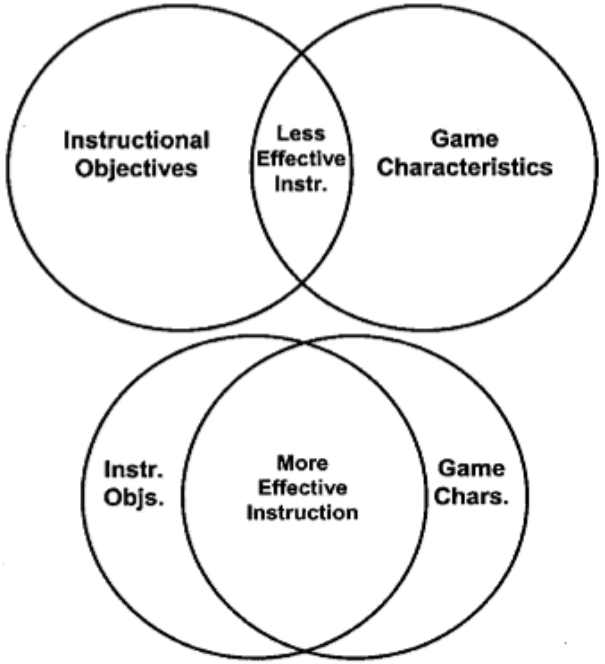


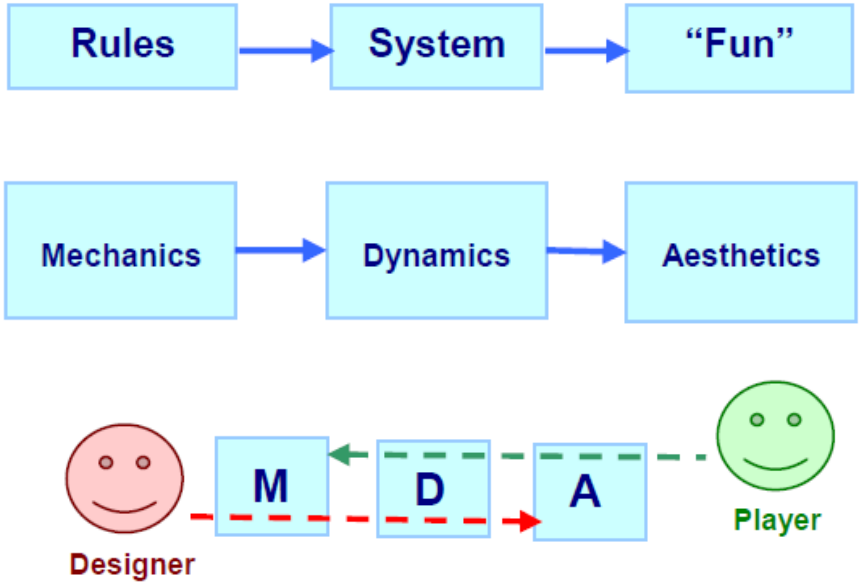
Figure 2:
Instructional Effectiveness as Degree of Overlap among Instructional Objectives and Game Characteristics

Hayes, 2005

Formal Approach to Game Design

MDA: A Formal Approach to Game Design and Game Research
- R. Hunicke, M. LeBlanc, R. Zubek (2004)

- **Mechanics** describes the particular components of the game, at the level of data representation and algorithms.
- **Dynamics** describes the run-time behavior of the mechanics acting on player inputs and each others; outputs over time.
- **Aesthetics** describes the desirable emotional responses evoked in the player, when she interacts with the game system.



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Where will the Future Bring Us

Google Maps Games

Interactive Fiction

MUDs

SimCountry

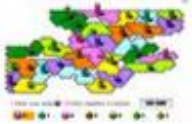
Sensor Based Games

PBEM Clients

ARGs

Simple Augmented Reality

DiceWars



Runescape

Augmented Advanced

Crowd Sourcing

Audio Only Games

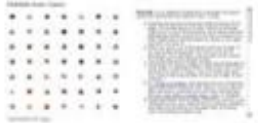
Ajax-Based Games

Habbo Hotel

Whyville

Webkinz / Neopets

Flickr Games



Passively Multiplayer

Fantasy Sports

Mass Balance

Dope Wars

Incident Commander

Geo Location

Questions